has been implemented in many other countries. ITU standards that are used in AMPS cellular include: E.164 - the global numbering plan. E.212 - the global mobile identification plan. Q.7xx - a series of standards defining Signaling System #7 (used as an alternative to ANSI SS7 in AMPS countries outside the US and Canada).

NANPA - North American Numbering Plan Administration
The organization responsible for allocating numbering resources within the North American Numbering Plan Area: USA, some of its territories, Canada and several Caribbean nations. Controlled by Bellcore until January 1998, it is now managed by Lockheed-Martin. It is responsible for assignment of new area codes within the North American Numbering Plan and office code assignments within US states and territories.

NENA - National Emergency Number Association
NENA, along with NASNA (National Association of State 9-1-1 Administrators), APCO (Association of Public Safety Communications Officials) and the TIA are responsible for promoting enhanced 9-1-1 standards for wireless systems.

TIA - Telecommunications Industry Association

WWTF - Wireline Wireless Integration Task Force

Government and Regulatory Organizations

Australian Communications Authority (ACA)
The organization responsible for the management of radio spectrum and telecommunications in Australia, formed by a merger of AUSTEL and SMA. APUMP represents people who are unhappy with the decision to eliminate analog cellular by the year 2000 in favor of the three GSM systems.

RSP - New Zealand Radio Spectrum Authority
Responsible for the management of radio spectrum in New Zealand.

US Dept. of Commerce
The Office of Telecommunications provides a great online source of worldwide wireless telecommunications information.

FCC - U.S Federal Communications Commission
The organization responsible for the management of telecommunications in the United States. Their responsibilities for public radio communications, such as cellular, include allocation of frequencies, the development of regulations that govern their use and monitoring to ensure that regulations are followed.

Wireless Telecommunications Trade Associations

ATIS - Alliance for Telecommunications Industry Solutions

CTIA - Cellular Telecommunications Industry Association
A trade association of wireless carriers in the United States, Canada and other countries. Originally a cellular organization, it now has members that are Manufacturers, PCS, ESMR and Satellite carriers.

CWTA - Canadian Wireless Telecommunications Association
A trade association of wireless carriers in Canada.

MMTA - Multi-Media Telecommunications Association
An association of companies focused on computer-telephony integration. They announced in November 1996 that they were merging with the TIA.

PCIA Personal Communications Industry Association
Formerly Telocator, this organization represents Paging, PCS, ESMR, SMR and mobile data service providers as well as communications site managers, equipment manufacturers, and others providing products and services to the wireless industry.

TIA Telecommunications Industry Association
United States Telephone Association.
A trade association for US local exchange carriers.

Wireless Forums

CDG CDMA Development Group
A trade association dedicated to the promotion of CDMA wireless technology.

MIPS Mobile Internet Phone Services Forum
A new group dedicated to promoting the development of Internet access technologies, services and features from mobile devices.

PACS Providers Forum
PACS (Personal Access Communication System) is a PCS system based on Bellcore's WACS and Japan's PHS, that will provide 64kbps voice and data, but is restricted to low mobility applications.

Universal Wireless Communications Consortium
Promoters of the IS-136 TDMA digital cellular and PCS standards, mostly through conferences and symposiums.

WDF The Wireless Data Forum is an independent, protocol-neutral trade group dedicated to promoting the wireless data industry. WDF's members include wireless operators and equipment providers, application developers and information technology companies working to advance wireless and mobile data products and services.

Glossary

Analog Signal A signal that varies in a continuous manner, such as voice.
ANI Automatic identification of the calling station
ANSI American National Standards Institute.
ATIS Alliance for Telecommunications Industry Solution (formerly ECSA). Responsible for ANSI SS7 standards and US GSM standardization.
BS Base Station
CPAS Cellular Priority Access Service
ESN Electronic Serial Number
GETS Government Emergency Telephone Service
HLR Home Location Register (database of subscriber records)
IFAST International Forum for AMPS Standards Technology
INC Industry Numbering Committee
IS TIA Interim Standard.
JEM Joint Experts Meeting
J-STD Joint ATIS and TIA standard.
LERG Local Exchange Routing Guide

LEA Law Enforcement Agency
MS Mobile Station (i.e. wireless phone)
MSC Mobile Switching Center (aka MTSO)
NAG Numbering Advisory Group
PACA Priority Access Channel Assignment
PN TIA Project Number. Identifies a project during development of a standard.
SP ANSI Standards Proposal. ANSI equivalent of a PN
TLDN Temporary Local Directory Number
TIA Telecommunications Industry Association
TTY Text Telephony
TDD Telecommunications Device for the Deaf
VLR Visited Location Register
WIN Wireless Intelligent Network

APPENDIX L

The following companies have submitted their names to the Alliance for Telecommunications Industry Solutions (ATIS), indicating that they have completed implementation of TTY over digital wireless networks and are compliant with Commission regulations regarding TTY transmission over digital wireless networks, as outlined in the Commission's Fourth Report and Order in CC Docket No. 94-102. Accordingly, neither ATIS or the TTY Forum, or any of their respective members or participants, make any representations or warranties as to the accuracy or completeness of this information.

AT&T Wireless
Caprock Cellular L.P.
Cingular Wireless LLC
Ericsson Inc.
Kyocera Wireless
Midwest Wireless Holdings L.L.C.
Motorola
Nextel Communications, Inc.
Sony Ericsson
Southern LINC

Implementation Status Reports
The following reports were provided to ATIS' TTY Forum.

AT&T Wireless FINAL Status Report for TTY Forum 23
11 October, 2002
Washington, D.C.

Note: AT&T Wireless is in full compliance with the FCC's TTY-Digital Compatibility Regulations. All network deployment activities are 100% completed. Therefore, this is AT&T Wireless' final report, and the company will be included on the ATIS list of fully-compliant carriers.

AT&T Wireless Accomplishments since last report:

Ericsson (GSM) The Ericsson E-CTM server was deployed in all AWS commercially launched GSM markets by 30 June, 2002. Markets that were not in service as of that date have been or will be deployed prior to their commercial launch.

Ericsson (TDMA): Successfully deployed in all AWS markets by 30 June, 2002.

Lucent (TDMA): TTY functionality was enabled in all Lucent TDMA markets in early March, 2002. A revised software patch for TTY that supports a nominal 22 millisecond character bit duration was made GA for network deployment in early Q2, 2002 and has been deployed in all AWS markets.

Mobile Testing: AT&T Wireless performed field testing on several TDMA and GSM TTY-capable handsets.

Nokia (GSM): TTY functionality was enabled in all Nokia GSM markets by 27 August, 2002 (in compliance with terms of limited waiver from the FCC).

Nortel (GSM): A revised patch to allow the routing of TTY calls to a circuit pool based on the status of the mobile's CTM bearer code was made GA in early Q2, 2002.

Nortel (TDMA): TTY functionality was enabled in all Nortel TDMA markets by 30 June, 2002.

Handset Availability:

TDMA

Sony/Ericsson: A Sony/Ericsson TTY compatible handset is generally available.
Motorola: A Motorola TTY compatible handset is generally available.

Nokia: A Nokia TDMA handset became generally available during the 2nd quarter of 2002.

GSM

Motorola: Motorola delivered a TTY capable handset to our lab during Q2, 2001, and is expected to be generally available in Q4, 2002.

Nokia: A Nokia TTY compatible handset is generally available.

Sony Ericsson: A Sony/Ericsson TTY compatible GSM phone is generally available.

Caprock Cellular L.P.

PO Box 119
Spur, Texas 79370

Progress of TTY-Digital Deployment Solutions

***CC* Docket No. 94-102**

Final Quarterly Report

October 10, 2002

Cap Rock Cellular has completed implementation of TTY- Digital Deployment Solutions and will be included on the TTY Forum's list of carriers that are compliant.

October 1, 2002

To: **TTY Forum**

From: **Susan Palmer and Ken Evans**

TTY Forum #23 Report
Cingular Wireless LLC

Overview

Cingular Wireless LLC (Cingular) continues to provide access to digital wireless service for its customers who use TTYs. All existing switches have been thoroughly tested to ensure TTY compatibility and all new switches must pass the same standard Gallaudet tests before commercial service is activated. TTY compatible handsets are available from three manufacturers in both GSM and TDMA markets. The National Center for Cingular Customers with Disabilities is providing customer support via a direct TTY phone number 1-866-241-6567. This number is listed on the Cingular Wireless website and bills next to the general, voice-based, customer care number. Cingular Wireless has also strongly encouraged its handset vendors to continue to design, develop and manufacture handsets that provide TTY access.

Cingular has been an active participant in TTY Forum related activities including week long ATIS test events starting in September of 2001. The purpose of the testing was to conduct cross infrastructure testing and to quantify the PSAP error issue. As noted in previous reports, testing has revealed that TTY calls to some PSAPs have yielded unacceptable error rates. Unfortunately, PSAP participation in ATIS sponsored testing has been minimal.

Going forward, Cingular will continue to participate in ATIS sponsored interoperability testing to insure cross network compatibility. This will include TTY Forum work with NENA and others to address the difficulties some PSAPs have with TTY signals over digital wireless networks.

Ongoing Issues

Calls to certain PSAPs are yielding unacceptable error rates. ATIS has invited industry participants to numerous weeklong test events. These invitations have been sent to wireless carriers, wireless infrastructure providers, wireless handset manufacturers, TTY terminal manufacturers, PSAPs, and PSAP equipment vendors. These tests have identified and resolved numerous technical and administrative issues. Unfortunately, PSAPs and PSAP equipment vendors have had minimal participation in only one test event. As a result, the industry has not been able to identify the source of the high error rates. ATIS has established a TTY test line to help PSAPs and PSAP equipment vendors determine their ability to communicate with wireless users. To date, only twenty-one individual PSAPs nationwide have participated in one of the

six testing events and only five PSAP equipment manufactures (out of thirty two) have utilized the existing technical tools available through ATIS to test their readiness to receive TTY signals. As a result, our customers may or may not be able to successfully make emergency calls using TTY. PSAP participation in TTY testing is essential to resolution of this problem.

Core Wireless Communications, L.L.C.

Core Wireless continues to make test calls with the Ultratec Compact/C Digital TTY device linked with a NOKIA 6360 TDMA Digital phone. There have been more successes than failures and at least one of the failures was due to the PSAP's TTY device being out of order.

Enclosed is information regarding Nortel Networks status to deliver TTY solutions to market in support of CCMA service providers' ability to meet FCC TTY milestone objectives.

- What is the status of TTY/TDD network infrastructure **software/hardware** development and **testing**?

  Nortel Networks response: Regarding the MTX10/NBSS10.x release, Nortel Networks has completed development, product test and verilicalion. Nortel Networks has completed internal testing using prototype and more recently using commercial mobile handsets with TTY capabilities from a few vendors. which have all shown positive results. Nortel Networks does not anticipate performance issues with any other vendor's handsets once they become available provided they are based on published standards. Nortel Networks has also performed tests with a leading manufacturer of TTY/TDD (Teletypewriter /Terminal lor Deaf Device) PSAP (Public Service Answering Point) equipment to ensure interoperability. Results of that specific testing were found to be positive'. This completed TTY/TDD solution is based on standards: IS-127-2 (EVRC) & IS 733-1 (13K Vocoder). Operators will De able to deploy the Nortel Networks TTY solution based on these original standards IS 733-1, IS127-2 to meet the FCC deadline lor implementation.
  New revisions of these standards namely IS-127-3 (EVRC TTY) & IS-733-2 (13K TTY) have been published as of September 2001 Nortel Networks plans to support this new addendum to the standards in our next scheduled software release, MTXI1/NBSS11, which is scheduled to be generally available (GA) 0 4 2002. Product testing for this newer, more robust TTY/TDD software based on the revised CDMA standards is currently underway. The latest test results have shown, under a variety of test conditions, that the TCER (Total Character Error Rate) is less than a percent. These positive results have been repeatable when interoperating with mobile terminals with TTY capabilities from a variety of different vendors who could make their test phones available to Nortel Networks during the testing of this TTY enhancement. Nortel Networks did conclude during interoperability that a few mobile terminals were attributing to a higher than usual TCER due to TTY algorithms internal to those handsets being less than the most current version at the time of testing. These vendors have taken steps to update their mobiles to the latest code; therelore Nortel Networks foresees no issues with interoperability with those mobile terminals in the future.

- For TTY/TDD what are the plans to work with any wireless carrier to perform end-to-end customer tests, and when will this occur?

  Nortel Networks response: I h e verification process for MTX10/NBSS 10.1.2 version of the TTY/TDD functionality with Nortel Networks lead customers was completed as of January 2002. The Nortel Networks TTY/TDD solution showed TCER of less than 1% in most cases and marginally exceeded 1% TCER in only the most strenuous RF and TTY/TDD test conditions'. Nortel Nelworks used several different TTY mobile terminals during these test activities. Please note the 1% TCER is not part of !ne FCC mandate.

  A more robust version of the TTY/TDD functionality based on the revised CDMA standards is to **be** delivered within the MTXI1/NBSS11 0 software release, which begins end-to-end lead customer validation testing later this summer.

  Operators are encouraged to request their handsel vendors to test their commercial-grade CDMA TTY capable handsets in Nortel Networks Wireless Interoperability Test Lab.

Nortel Networks acknowledges that the positive results of the TTY/TDD software feature *is* a direct function of the TTY/TDD equipment available lo Nortel Networks and their lead customer verification partners at the time of TTY/TDD development. testing. and full network verification. Also note that Some of the commercially deployed PSAP

equipment, consumer TTY/TDD devices, and TTY/TDD capable digital mobile terminals will not comply with the same published standards from which Nortel Networks TTY/TDD solution was developed and tested. This reality will impact wireless operators who strive to deliver the best quality solution. Some operator effort will be required to procure the proper permutation of TTY/TDD equipment to inter-work with Nortel Networks TTY/TDD infrastructure software.

- What is the Network infrastructure software/hardware **planned general availability dates** that support the deployment of this regulatory feature?

Nortel response: In order that wireless network operators may comply with the FCC's June 30, 2002 requirement for TTY/TDD implementation, Nortel Networks has made TTY/TDD enabling software available as follows:

Software load	CDMA SW general availability
MTX10/ NBSS10.x	Now Available (January 2002)

- What are the **hardware baseline and software baseline** to support CDMA TTY/TDD functionality?

Nortel Networks response:

Regulatory solution required	CDMA HW/SW baseline
TTY/TDD	NBSS10.x SW (BSS)** TTY capable handsets (3rd party)

Note: NBSS10.x will operate with MTX09 software, however this configuration will only be supported for 30 days. NBSS software is only fully supported on the previous MTX software version as a step to upgrading to the most current MTX version. I.E. All customers require MTX10 software to not only maintain a supported NBSS10.x load, but to also enable the regulatory feature set contained in MTX10 e.g. CALEA, LNP, E911 phase 2.

Please also note that the MSC itself must meet certain hardware requirements in order to upgrade to the MTX10 version of software e.g. processor speeds, memory size. These requirements were communicated to customers in the year 2000. Nortel Networks customer account team personnel churn related to Nortel Networks 2001 downsizing activities impacted some smaller customers. In these instances communication did not occur until Q2 2001.

- What is the **schedule for deployment** of the software/hardware in the network?

Nortel Networks response: The minimum baseline software requirements for this functionality are given above. For questions related to scheduling its deployment into an operator's network, please contact Nortel Networks Product Deployment. The majority of Nortel Networks U.S. CDMA customers (>85%) has already upgraded to MTX10/NBSS10.x software and is therefore TTY/TDD ready. Most of the *remaining* CDMA customers are currently showing plans for MTX10/NBSS10 upgrade after June 30, 2002. Many of these smaller customers that have yet to upgrade have significant hardware prerequisites to procure prior to being able to upgrade their MTX and BSC baseline software version. Many of these same operators have scheduled MTX10/NBSS10.x release for later this year, which is when these mitigating baseline issues delaying switch readiness are closed. There are a relatively small number of rural cellular customers that from whom Nortel Networks has not received confirmation of their upgrade plans.

MTX11/NBSS11.x software will begin to be deployed into lead customers' networks during the fourth quarter of this year, delivering more robust TTY/TDD software based on the revised CDMA standards.

Nortel Networks recommends that all customers who have not yet ordered and scheduled upgrade MTX10/NBSS10.x to please contact Nortel Networks to ensure the most expeditious network upgrade.

- What are Nortel Networks **plans** to test their own or other vendor handsets with your switch solution?

  Nortel Networks response: Nortel Networks provides only infrastructure for wireless networks. Nortel Networks does not provide mobile hardsets. Norlel Networks recommends that the operator engage its handset vendor(s) in order to respond to the FCC regarding handsel availability and interoperability test results with Nortel Networks infrastructure.

  Operators are encouraged to request their handset vendors to test their commercial grade **CDMA TTY** capable handsets in Nortel Networks **Wireless** Interoperability **Test** Lab.

  Please contact Cher Bruce tor scheduling TTY testing in the Nortel Networks Wireless Interoperability Test Lab. where testing is based on current published standards (Phone: 972-684-2299; Fax: 972-684-3881 csbruce@nortelnetworks.com)

- Contacts:

Product Marketing	MTX10/NBSS10.x SW	Kurt Raaflaub	(972) 685-2971
Product Management	CDMA TTY/TDD	Maniarn P	(972) 685-7203
Regulatory	E911Ph2&TTY/TDD	Charles Spann	(903) 852-6798
Product Deployment	CDMA NBSS SW	Mark Schwarrer	(972) 685-5851

Enclosed is information regarding Nortel Networks plans to deliver a TTY solution in support of TDMA service providers' ability to meet the FCC TTY milestone objective.

What is the status of TTY/TDD network infrastructure **software/hardware development and testing';**

Nortel response: Nortel Networks has completed development and testing activities regarding TDMA TTY/TDD functionality. End-to-end system validation within operator networks has also been completed This TDMA TTY/TDD solution was tested to be compliant to IS-823A (TTY/TDD Extension to TIA/EIA 136-410 Enhanced Full Rate Speech Codec) for the EFRC Codec. and to IS-840 Nortel Networks has tested this feature with alpha/beta handsets from a few major vendors, which have all shown positive result,;'. We have also received TTY capable mobile handsets containing commercial TTY software from major vendors, which have shown excellent interoperability test results. Nortel Networks has also performed tests with a leading manufacturer of TTY/TDD (Teletypewriter /Terminal lor Deaf Device) PSAP (Public Service Answering Point) equipment to ensure interoperability. Results of that specific testing were lound to be positive.

Nortel Networks plans to support new and evolved standards in this year's next software releases. A more robust 'version of the TTY/TDD functionality is to be delivered within the MTX11 soltware release. MTXI1/NBSS11 is scheduled lo be generally available (GA) Q4 2002. This new TTY/TDD version has completed internal testing and has shown greatly improved robustness' when used with certain widely used, but older versions of PSAP equipment that may have issues fully meeting TTY standards.

Operators will be able to deploy Norlel Networks current TTY solution i.e. MTX10, which is based on the IS-823A and IS-840 standards, to meet the FCC deadline lor implementation.

- For TTY/TDD what are the plans to work with any wireless carrier to perform **end-to-end customer tests** and when will this occur?

Nortel response: The verification process with Nortel Networks lead customers for the MTX10 software version of the TTYiTDD lunctionality has completed as of January 2002. The Nortel Networks TTY/TDD solution showed TCER (Total Character Error Rate) of less than 1% in most cases and marginally exceeded 1% TCER in only the most strenuous RF and TTY/TDD test conditions. Nortel Networks used several different TTY mobile terminals during these test activities'. Please note the 1% TCER is not part of the FCC mandate.

A more robust version of the TTY/TDD lunctionality is to be delivered within the MTX11 software release, which begins end-to-end lead customer validation testing later this summer.

Operators are encouraged to request their handset vendors to test their commercial-grade TDMA TTY capable handsets in Nortel Networks Wireless Interoperability Test Lab.

'Noriel Networks acknowledges that the positive results 01 the TTYITDD software leature *is* a direct function *of* the TTY/TDD equipment available *to* Nortel Networks and their lead customer verification partners at the time of TTY/TDD development. testing. and full network verification. Also note that some of the commercially deployed PSAP equipment. consumer TTYITDD devices, and TTY/TDD capable digital mobile terminals will not comply with the Same published standards from which Norlel Networks TTYITDD solution was developed and tested. This reality will impact wireless operators who strive to deliver the best quality solution. Some operator effort will be required to procure the proper permutation of TTYITDD equipment to inter-work with Nortel Networks TTY/TDD infrastructure software.

- What is the Network infrastructure software/hardware planned general availability dates that support the deployment of this regulatory feature?

  Nortel response: In order that wireless network operators may comply with the FCC's June 30, 2002 requirement for TTY/TDD implementation, Nortel Networks has made TTY/TDD enabling software available as follows:

Software load	TDMA SW general availability
MTX10 TDMA (incl. EDSPM)	Now Available (January 2002)

- What are the hardware baseline and software baseline to support TDMA TTY/TDD functionality?

  Nortel response:

Regulatory solution required	TDMA HW/SW baseline
TTY/TDD	EDSPM SW for the ICP: MTXIO SW lor the DMS-MTX** TTY capable handsets (3rd party)

Please note that the MSC itself must meet certain hardware requirements in order to upgrade lo the MTXIO version of software e.g. processor speeds, memory Size. These requirements were communicated to customers in the year 2000 Nortel Networks customer account team personnel churn related to Nortel Networks 2001 downsizing activities impacted Some smaller Customers. In these instances communication did not occur until 0 2 2001

- What is the schedule for deployment 01 the software/hardware in the network?

  Nortel Networks response' The minimum baseline soltware requirements for this functionality are given above. For questions related to scheduling its deployment into an operator's network, please contact Nortel Networks Product Deployment. Most of Nortel Networks U.S. TDMA customers (>80%) have already upgraded to MTX10 arid are therefore TTY/TDD ready. Most of the remaining TDMA customers operate smaller networks and are currently showing plans lo order and/or schedule a full network MTX10 upgrade after June 30, 2002. Many of these smaller customers that have yet to upgrade trave significant hardware prerequisites to procure prior to being able to upgrade their MTX software baseline release. Many of these same operators have scheduled MTX10 for later this year, which is when these mitigating baseiine issues delaying switch readiness are closed. Other operators may choose to migrate their networks to improved digital technologies e.g. CDMA or GSM. There is relatively small portion of rural cellular customers that from whom Nortel Networks has not received confirmation of upgrade plans.

  MTX11 software will begin to be deployed into lead TDMA customers' networks during the fourth quarter of this year, delivering even more robust TTY/TDD software.

  Nortel Networks recommends that all customers **who** have not yet ordered and scheduled **upgrade MTXIO *to*** please contact Nortel Networks to ensure the most expeditious **MSC upgrade.**

- What are Nortel Network's plans to **test their own or other vendor handsets** with your switch solution?

  Nortel Networks response. Nortel Networks provides only infrastructure for wireless networks. Nortel Networks does not provide mobile handsets. Nortel Networks recommends that the operator engage handset vendor(s) in order to respond to the FCC regarding handset availability and interoperability test results with Nortel Networks infrastructure.

  Operators are encouraged to request their handset vendors to test their commercial grade TDMA TTY capable handsets in Nortel Networks Wireless Interoperability Test Lab.

  Please contact Gerry Chaparro for scheduling TTY testing in the Nortel Networks Wireless Interoperability Test Lab, where testing is based on current published standards (Phone: 972-684-4827 Fax 972-684-3881: mailto:chaparro@nortelnetworks.com)

- **Contacts:**

Product Marketing	MTX10 SW	Kurt Raaflaub	(972) 685-2971
Product Management	TDMA TTY/TDD	Doug Kinnaird	(403) 769-8461
Regulatory	TTY/TDD	Charles Spann	(903) 852-6798
Product Deployment	MTX/NBSS SW	Mark Schwarzer	(972) 685-5851

MMCD/Panasonic

Matsushita Mobile Communications Development Corporation of U.S.A

Panasonic TTY/TDD Forum # 23 Status Report

Oct. 8, 2002

Panasonic has been a participant in the TTY forum since November 9, 2000 and is very active producing products that are accessible to the disabilities community. We were happy to announce the general availability of the first digital TTY compliant TDMA handset to the market back in December 2001. We are thankful for the help and cooperation from our industry partners, Alliance for Telecommunications Industry Solutions (ATIS) and the TTY Technical Solutions Incubator (TTSI) with testing and determining technical solutions. We are also thankful *to* Gallaudet University, National Association for the Def (NAD), and Telecommunications for the Deaf, Inc (TDI) for helping us design a user-friendly TTY capable handset. We are currently designing GSM handsets with TTY capability and incorporating the many lessons we have learned through the forum.

We are also proud to have worked with the many good people from the forum and *to* contribute to the industry meeting the deadline.

Pieter 3 Seidel
Manager Hardware Verification
Panasonic/MMCD